U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia
Monthly Water Conditions Summary

December 2014 – Seventy-three percent of groundwater levels and 88 percent of monthly mean streamflows were normal in Maryland, Delaware, and the District of Columbia.

Why is it important for the USGS to collect and analyze water-resources data?

USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during floods and droughts. These data can be used to assess how water resources respond to changes in climate. Scientists at the USGS have measured streamflow and groundwater levels in wells to assess water resources for over 125 years.

In addition to providing the most extensive set of historical streamflow and groundwater data available to the public, the USGS collects water data and quality-assures the data by employing standardized techniques across the country. The uniformity of the dataset allows for multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water-resources conditions they might encounter in the future.

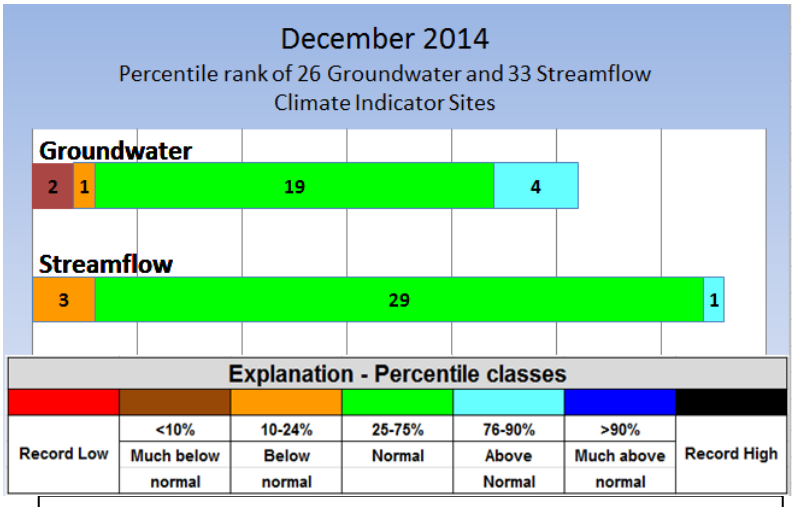
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized. Precipitation and reservoir data are also presented to give a more complete picture of the region's water resources.

USGS December 2014 Water Conditions Summary

In December, 73 percent of the groundwater levels and 88 percent of the monthly mean streamflows were normal (between the 25th and 75th percentiles) at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia.

Groundwater levels were normal (between the 25th and 75th percentiles) in 73 percent, or 19 of the 26 wells used to monitor climatic conditions in Maryland and Delaware in December. Groundwater levels were above normal in four wells and below normal in three wells.

December monthly mean streamflows were normal at 88 percent, or 29 of the 33 streamgages. Streamflow was above normal at one streamgage, and below normal at three streamgages.



A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal.

For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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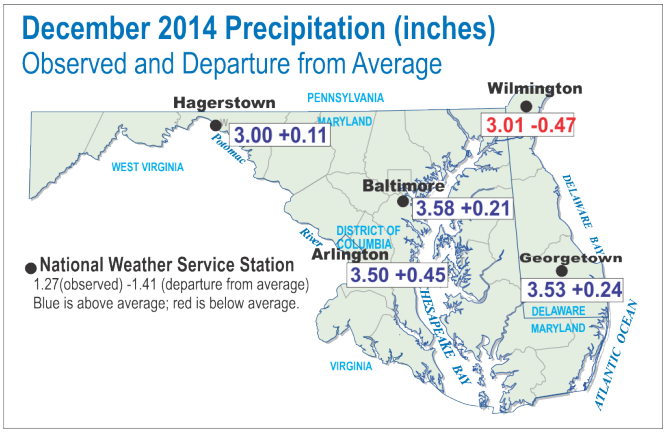
December 2014 Precipitation and Weather

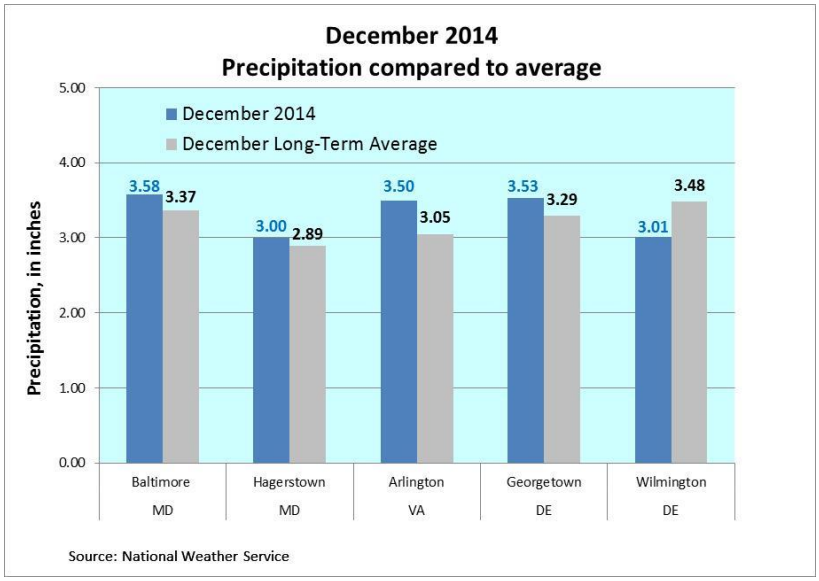
Precipitation in December was above the long-term average at the National Weather Service (NWS) Mid-Atlantic weather stations in Baltimore and Hagerstown in Maryland, Georgetown, Delaware, and Arlington, Virginia, and below average at the NWS station in Wilmington, Delaware. The highest amount of monthly rainfall was in Baltimore, Maryland, with 3.58 inches, and the lowest was in Hagerstown, Maryland, with 3.00 inches.



National Weather Service Stations

Baltimore =
Baltimore/Washington International Thurgood Marshall Airport (BWI)
Georgetown =
Georgetown, Sussex County Airport
Hagerstown =
Hagerstown Regional Airport
Arlington =
Ronald Reagan Washington National Airport
Wilmington =
New Castle Airport

The NWS Middle Atlantic River Forecast Center's (MARFC) 365-day precipitation data showed that all counties in Maryland and Delaware, and the District of Columbia were classified as average (between the 25th and 75th percentiles) to above average, except for Allegany County, Maryland, which was below normal.



In Maryland, Harford County had the highest surplus of rain with 10.9 inches and Allegany County had the largest deficit of 6.7 inches over the 365-day period from December 2013 to December 2014. See the links below to view the NWS MARFC data.

December air temperatures were between 3.2 – 4.2 degrees Fahrenheit above the long-term average at all five NWS Mid-Atlantic weather stations. The temperatures ranged from 38.2 degrees Fahrenheit in Hagerstown, Maryland to 43.7 degrees Fahrenheit in Arlington, Virginia near the District of Columbia.

Sources:
National Weather Service
MD and DC: http://www.weather.gov/climate/index.php?wfo=lwx
DE: http://www.weather.gov/climate/index.php?wfo=phi
Middle Atlantic River Forecast Center (MARFC): http://www.erh.noaa.gov/marfc/Precipitation/Departures/

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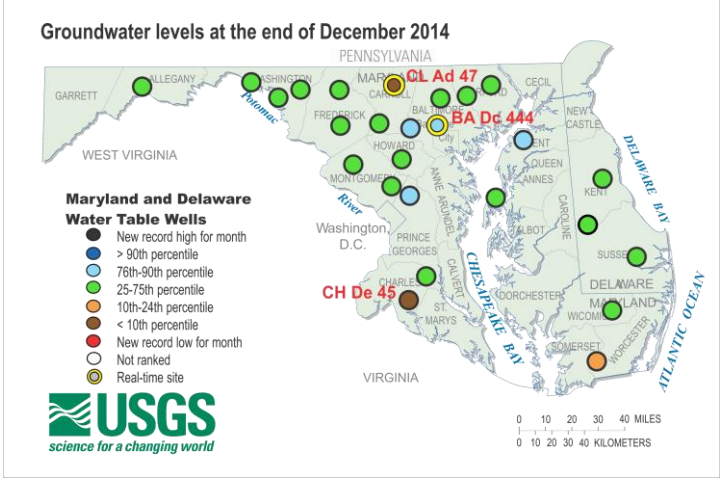
Groundwater

The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- Located in an unconfined (water-table) aquifer;
- Open to a single, known hydrogeologic unit/aquifer;
- Groundwater hydrograph reflects changes in climatic conditions;
- No indicated nearby pumpage and likely to remain uninfluenced by pumpage, regulated streamflow, or changes related to human activities;
- Minimum period of record is 10 years of continuous/monthly records;
- Minimally affected by irrigation, canals, drains, pipelines, and other potential sources of artificial recharge;
- Well has casing – dug wells are generally not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

December 2014 Groundwater Levels

Groundwater levels were normal (between the 25th and 75th percentiles) in 19 of the 26 wells used to monitor climatic conditions in Maryland and Delaware in December. For the remaining seven wells, groundwater levels were above normal in four wells and below normal in three wells. The groundwater level in USGS observation wells CL Ad 47 in Carroll County, Maryland and CH De 45 in Charles County, Maryland were below the 10th percentile.

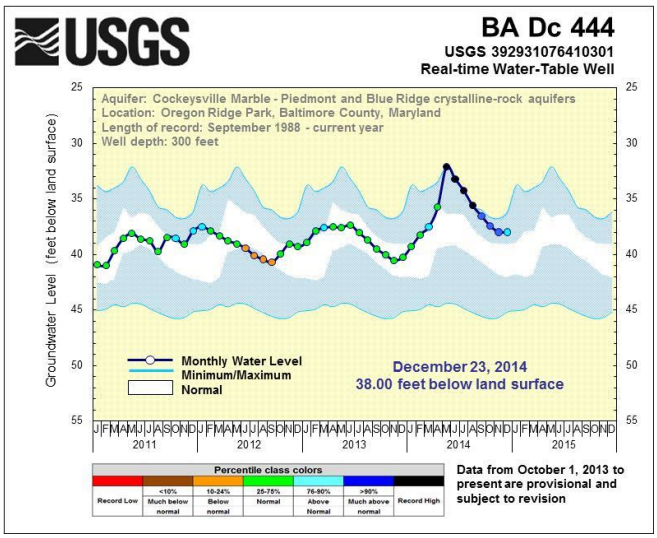


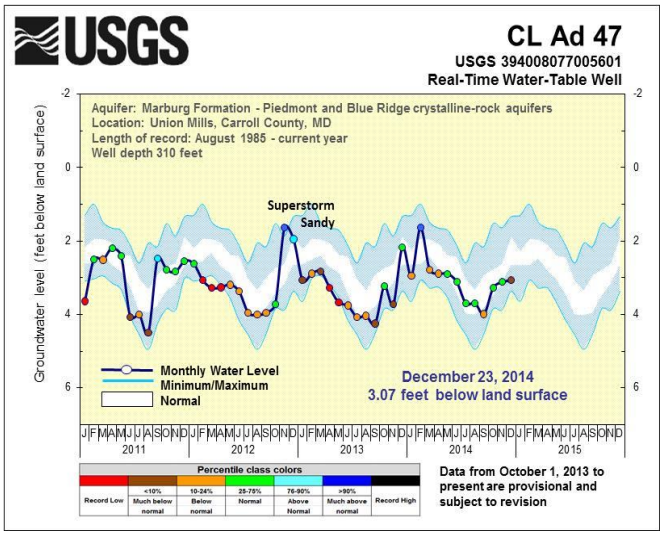
Groundwater levels in Delaware were normal at the three USGS observation wells.

To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

The groundwater level in USGS observation well BA Dc 444 in Baltimore County, Maryland has steadily decreased from the record high level it had been at from May through August, however, it remains above normal in the 76th to 90th percentile. In contrast, the groundwater level in USGS observation well CL Ad 47 in Carroll County, Maryland has risen for the third consecutive month, but now ranks below normal in the 10th to 24th percentile.





Five-year groundwater hydrographs can be viewed at:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties

These 5-year hydrographs show groundwater levels as a dark blue line, the minimum and maximum monthly values, and the normal range (between the 25th and 75th percentiles) as a white band based on the period of record. The maximum water level is at the top of the upper blue section and the minimum water level is at the bottom of the lower blue section in the graph. Each monthly measurement is colored according to the percentile rank in which it falls for the month.

U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia
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Streamflow

Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamgages in the region.

The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

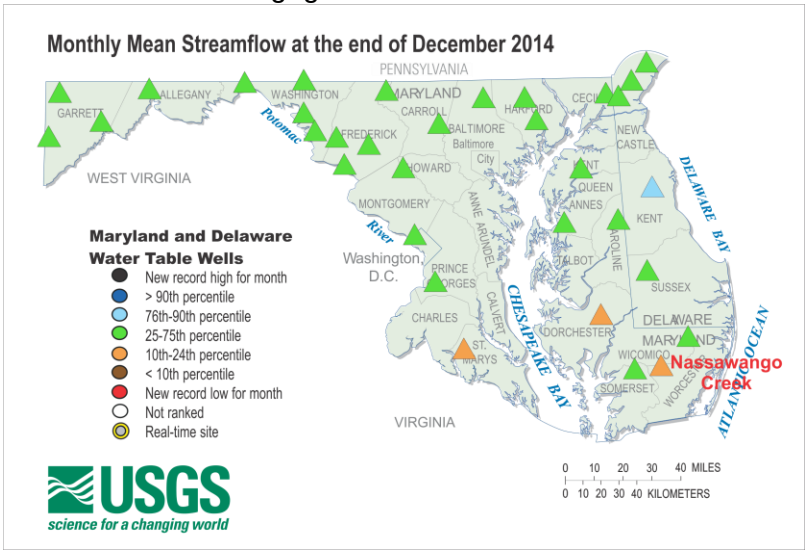
- Minimum period of record is 10 years of continuous data;
- Watershed areas greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflect climatic conditions; and
- The surrounding area and watershed are not urban.

December 2014 Streamflow

Monthly mean streamflows were normal at 29 of the 33 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia in December. Normal is considered to be between the 25th and 75th percentiles. Since July, approximately 70 percent (at least 22 of the 33 USGS streamgages) of the monthly mean streamflows have been in the normal range.

December monthly mean streamflow was below normal at two USGS streamgages on the southern Delmarva Peninsula, including the Chicamacomico River in Dorchester County, Maryland, which was below normal for the sixth consecutive month.

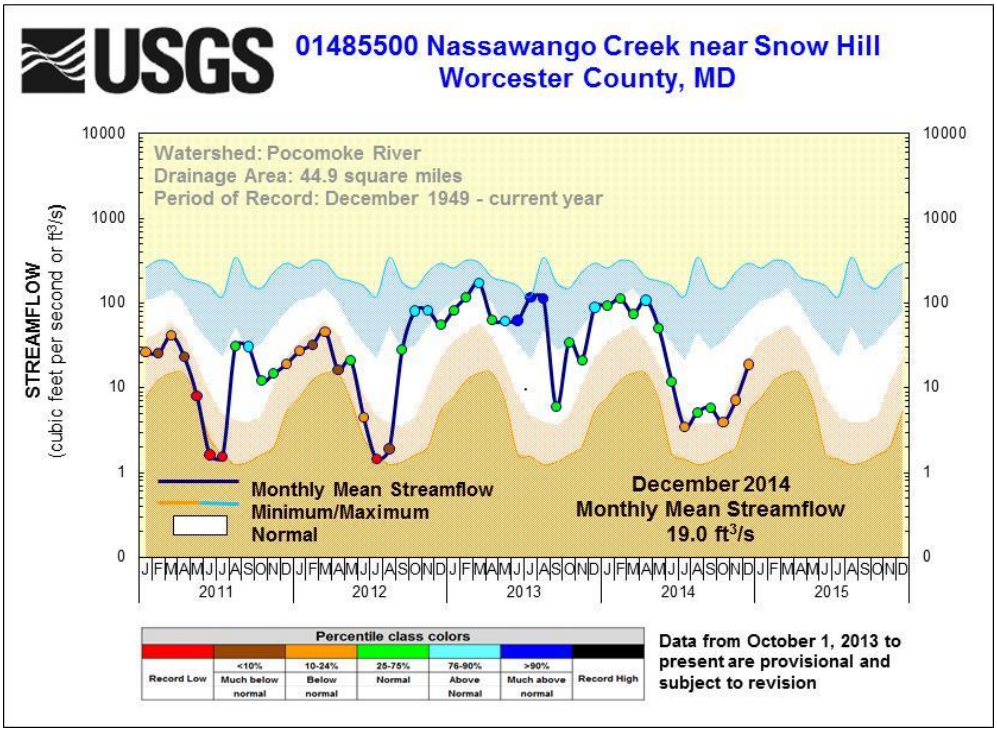
In Delaware, all monthly mean streamflow were normal in December, except for the St Jones River in Kent County, which was above normal.



To access the clickable streamflow map, go to:
http://md.water.usgs.gov/surfacewater/streamflow/

U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia
Monthly Water Conditions Summary

December monthly mean streamflow was between the 10th and 24th percentiles on the Nassawango Creek in Worcester County, Maryland for the third consecutive month. Two nearby streams, Manokin Branch and the Pocomoke River, were in the normal range.

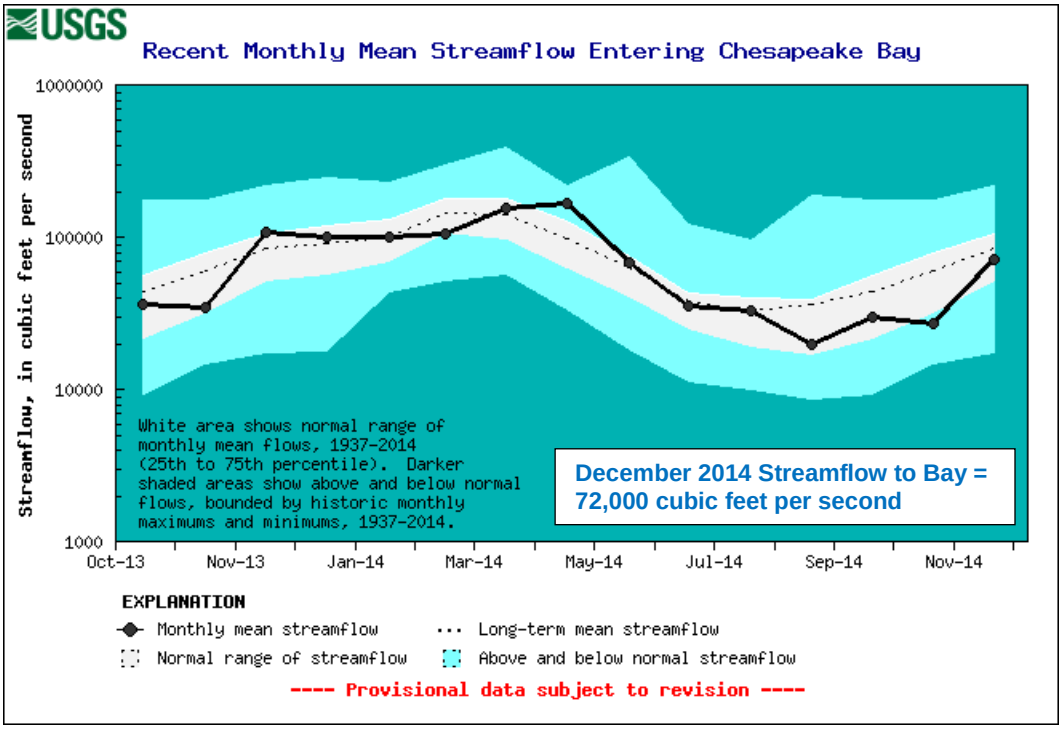


Five-year hydrographs can be viewed at:
http://md.water.usgs.gov/surfacewater/streamflow/

The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25th to 75th percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area. Each monthly mean measurement is colored according to the percentile rank in which it falls for the month.

Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was normal in December 2014 at 72,000 cubic feet per second (ft^3/s; provisional, and subject to revision). The average (mean) monthly streamflow for December is 85,400 ft^3/s. The normal range for average (mean) monthly streamflow for November is between 50,800 ft^3/s and 107,000 ft^3/s, the 25th and 75th percentiles of all December values. These provisional statistics are based on a 78-year period of record.



Data and more information on the freshwater flow to the Bay can be found here: **http://md.water.usgs.gov/waterdata/chesinflow/**

Reservoir Levels

Available reservoir storage at the end of December in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was 100 percent of available storage capacity, or a total of 75.85 billion gallons of water.

Total normal storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George's Counties in suburban Maryland around the District of Columbia, increased 7.5 percent since November to 82.5 percent of normal storage capacity at the end of December, with 8.75 billion gallons of water. Not all of the water in the Patuxent Reservoirs is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage.

December 2014	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			**Baltimore City – Environmental Services Division**
Liberty	100	36.80	
Loch Raven	100	21.20	
Prettyboy	100	17.85	
Total	100	75.85	
Patuxent Reservoirs			**Washington Suburban Sanitary Commission (WSSC)**
Triadelphia	84	4.70	
Duckett	81	4.05	
Total	82.5	8.75	